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APPLICATION FOR UNITED STATES LETTERS PATENT  
FOR

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**METHOD AND SYSTEM FOR TRACKING SCREEN ACTIVITIES ~~FOR MULTI-SCREEN TRANSACTIONS~~**

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5 **METHOD AND SYSTEM FOR TRACKING SCREEN ACTIVITIES ~~ESY~~ FOR MULTI-  
SCREEN TRANSACTIONS**

**[0001] CROSS REFERENCE TO RELATED APPLICATION**

10 This is a continuation-in-part of co-pending U.S. application No.:  
09/492,559, entitled "Method and System for Tracking Screen Activities in  
Online Transactions", filed on January 27, 2000, and co-pending U.S.  
application No.: 09/644,404, entitled "Method and System for Tracking  
Screen Activity", filed on August 23, 2000, all by the applicants thereof  
15 09/705,391, now US Pat. No.: 6,662,226.

**[0002] BACKGROUND OF THE INVENTION**

**[0003] Field of the Invention**

**[0004]** ——— The present invention relates to interactions with terminal  
devices having a user interface to display information, and more particularly to a  
20 method and system for capturing, tracking, storing, augmenting and replaying the  
displayed information encountered during one or more interactive session, wherein  
the one or more interactive session involves a series of screen displays.

**[0005] Description of the Related Art**

**[0006]** ——— Various information is accessed through wide area networks  
25 (WAN) such as the Internet. The content of these wide area networks is dynamic,  
information is always being added and deleted. Information available at one time  
may be unavailable at a later time because a user may not save it when it was  
available or its source may have been deleted, or it may be still available but the

5 user is not quite sure of its location. In other cases, one desires to see how others proceed with interactions with provided information.

**[0007]** \_\_\_\_\_Computing devices enable users to interact with various information streams such as interaction with various web sites over the Internet. These interactions are typically achieved via hardware devices including a display  
10 device and a user interface (i.e., a keyboard and a pointing device). In order to instruct a computing system to perform a task, a user may type a command on a keyboard or make a selection from a menu or button bar using a pointing device (e.g., a mouse or touch pad). In response to the user's input, the computing system may display text on the display device, display an image or play a sound,  
15 all of which provides an indication to the users of the results of their interaction.

**[0008]** \_\_\_\_\_Selectively preserving some of these interactions is akin to transmitting the information associated with a particular interaction from the present to the future. There is therefore a need for information retention, source identification, and processing services associated with the transmitted information  
20 from designated terminal devices. Additionally, since this information must be stored for future access, there is also a need for information annotation (i.e., from where, for who and when).

#### **[0009] SUMMARY OF THE INVENTION**

25 **[0010]** \_\_\_\_\_An object of the present invention is to provide a method and system that facilitates an individual, enterprise or business entity to record, store, process and manage information associated with interactions transacted on designated terminal devices. More

5 specifically, individual and sequenced display presentations are  
captured or recorded and supplemented with associated information  
such as input control sequences, time stamps, user specific  
identification information, processing instructions, source information  
and validation information which may take the form of alpha numeric  
10 sequences or machine readable entities either of which may be  
encrypted.

**[0011]** In an embodiment of the present invention, software  
agents (resident on a user's terminal device and/or a remotely  
accessible server devices) record the activities associated with a given  
15 interactive session where that interactive session comprises a series of  
screen displays and any associated user interface or network activity.  
The captured information is indexed, processed (i.e., sensitive  
information may be encrypted and the captured content may be  
compressed for efficient storage) and stored for future access (i.e.,  
20 replay or playback) either on the initiating terminal device or a  
designated remote server device. Additionally, since source addressing  
information is retained with the captured information, future  
modifications to source files associated with the captured information  
may also be tracked either offline or upon request.

25 **[0012]** The present invention can be implemented in numerous  
forms. Different implementations of the present invention yield one or  
more of the following advantages. One advantage of the invention is that  
an effective digital tracking system is provided to track device  
interactions (i.e., screen activity over a period of time and associated  
30 input and network interactions) associated with user interactions with

5 various information streams accessible through a network such as the  
Internet or an Intranet. This capturing process may be activated  
automatically or may be initiated by the user as desired. Another  
advantage of the present invention is that the captured information can  
be processed (i.e., encryption, compression) augmented by time  
10 stamps, user specific information (i.e., electronic signatures) and  
validation information which may take the form of alpha-numeric  
character strings or machine readable entities which may be encrypted.  
Still another advantage of the present invention is the captured  
information may be stored and managed on initiating terminal device  
15 and/or remotely on a designated server device for future reference.

**[0013]** —The foregoing and other objects, features and  
advantages of the invention will become more apparent from the  
following detailed description of a preferred embodiment, which  
proceeds with reference to the accompanying drawings.

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**[0014] BRIEF DESCRIPTION OF THE DRAWINGS**

**[0015]** —The present invention will be readily understood by the following detailed description in conjunction with the accompanying drawings, wherein like reference numerals designate like structural elements, and in which:

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**[0016]** **Figure 1** is a block diagram of a networked communication system which may be used to implement the method and system embodying the invention;

15

**[0017]** **Figures 2** shows a functional diagram of a TSR (Transaction Recording System) Server which may be used in conjunction with the implementation of an embodiment of the present invention;

**[0018]** **Figures 3A to 3G** illustrate representative screen displays which may be captured, validated and processed in accordance with an embodiment of the present invention;

20

**[0019]** **Figure 4** illustrates a representative series of screen displays which may be captured in accordance with an embodiment of the present invention;

25

**[0020]** **Figure 5** is a flow diagram of the process associated with processing (i.e., encryption, validation and compression) a series of captured screen displays in accordance with an embodiment of the present invention;

5       **[0021]**       **Figure 6A** is a process of a terminal device being  
interacted with a user;

**[0022]**       **Figure 6B** is a process of a server communicating with the  
terminal device in **Figure 6A**; and

10       **[0023]**       **Figure 6C** shows a process of retrieving the archived file  
at a terminal associated with the server of **Figure 6B**.

**[0024]       DETAILED DESCRIPTION OF THE INVENTION**

15       **[0025]**       The invention pertains to a method and a system for  
capturing, processing and replaying a series of screen displays  
associated with one or more transactions. As used herein, a transaction  
means data exchange between two devices. For example, a transaction  
occurs when a provider accepts an order of certain items from a buyer.  
Likewise a transaction is deemed to occur when pertinent  
data/information entered/provided by one side is released to the other  
side. In general a transaction means a sequence of information  
20       exchange and related work (such as database updating) that is treated  
as a unit for the purposes of satisfying a request and for ensuring  
database integrity. For a transaction to be completed and database  
changes to occur, a transaction has to be completed in its entirety. One  
of the common transactions over the Internet is a catalog merchandise  
25       order by a customer. When the order is received on the server side, the  
order transaction involves checking an inventory database, confirming  
that the item is available, placing the order, and confirming that the order  
has been placed and the expected time of shipment. If the order is  
deemed as a single transaction, then all of the steps must be completed

5 and validated before the transaction is successful and the database is actually changed to reflect the new order.

10 **[0026]** Generally, a transaction is supported by one or more screen displays so that a user can interact with the displays to conduct the transaction. One of the key features in the present invention is to capture such displays including user's interaction. Another feature is to provide a mechanism to store and manage the captured displays. Still another feature is to playback the stored displays so that review of the displays reveals how a user interacts with his/her terminal to proceed with a transaction. In one embodiment, the stored information as a  
15 series of captured screen interactive information (i.e., screen displays and user inputs) can be augmented with validation information and played back in a predefined order upon request.

20 **[0027]** Terminal devices, also referred to as computing devices herein, include but are not limited to personal computers, laptop computers, computer terminals, personal digital assistants, palm-sized computing devices, cellular phones, two-way pagers and computer work stations. Such devices typically have a user interface comprised of a display, a keyboard/keypad and a pointing device (e.g., a mouse, a trackball, a joystick, a navigation key-set or a touch-pad).

25 **[0028]** The detailed description of the invention is presented largely in terms of procedures, steps, logic blocks, processing, and other symbolic representations that directly or indirectly resemble the operations of data processing devices coupled to networks. These process descriptions and representations are typically used by those



5 skilled in the art to most effectively convey the substance of their work to  
others skilled in the art. Reference herein to "one embodiment" or "an  
embodiment" means that a particular feature, structure, or characteristic  
described in connection with the embodiment can be included in at least  
one embodiment of the invention. The appearances of the phrase "in  
10 one embodiment" in various places in the specification are not  
necessarily all referring to the same embodiment, nor are separate or  
alternative embodiments mutually exclusive of other embodiments.  
Further, the order of blocks in process flowcharts or diagrams  
representing one or more embodiments of the invention do not  
15 inherently indicate any particular order nor imply any limitations in the  
invention.

**[0029]** Referring now to the drawings, in which like numerals refer  
to like parts throughout the several views. **Figure 1** shows a basic  
system configuration in which the present invention may be  
20 implemented in accordance with a preferred embodiment.  
Communications system **100** generally includes a plurality of  
communications networks such as wireless network **102** with an  
associated SMS channel and data network **104** (i.e., the Internet or a  
private intranet). These communications networks support  
25 communications between a plurality of diverse terminal devices, such as  
is illustrated by wireless communication device **108** (i.e., a cell phone),  
personal digital assistant (PDA) **112**, personal computer **124** and a  
plurality of network servers represented by network server **150**.

**[0030]** According to one embodiment of the present invention,  
30 services associated with the capture and storage of a terminal device

5 activities are processed by software modules resident on the initiating terminal device (i.e., PDA **112**) or on remote server devices such as Transaction Recording System (TRS) Server **140**. These software modules provide services relating to the acquisition, processing (i.e., compression and encryption), validation and management of screen display content (i.e., a series of screen displays), input commands, 10 device status information, user specific information, source specific information, network information, resource utilization (i.e., printers and external storage devices), time stamps and in general any information associated with the user's interaction with the terminal device.

15 Additionally, the software modules provide services related to the management and utilization of local and remote user specific storage areas.

**[0031]** The communication system illustrated in **Figure 1** is provided for purposes of illustration and not limitation. It would be 20 understood by one of ordinary skill in the art that the present invention may be practiced in a communications system having configurations and system components that differ from those described above.

**[0032]** According to one aspect of the present invention, a user interacting with a terminal device (i.e., PDA **112**), via an associated user 25 interface (i.e., a touch screen and associated display), may initiate the capture process to capture a series of displays on a screen through a pre-defined user interface interaction (i.e., a soft key on PDA **112**). Upon process initiation, software modules resident on the terminal device or embedded as an applet or an application cause a series of 30 screen displays and associated device and network interactive event

5 indications to be captured. The captured images and event indications  
may be supplemented with validation information (i.e., a time stamp, a  
user specific electronic signature and validation information which may  
take the form of alpha numeric character strings or machine readable  
marks) and then processed for storage and future display. The archived  
10 event information may be stored locally and/or on a designated remote  
server device for future reference.

**[0033]** It is defined without the loss of generality that an  
interaction involves activities (i.e., display content, user input/output in  
response to what is being displayed in the subject terminal device)  
15 performed by a user with respect to the user interface of a terminal  
device that may or may not be networked. Some key advantages of the  
present invention include the ability to archive device interactions,  
validate those interactions (i.e., an encrypted alpha numeric character  
string which encodes a portion of the archived content) and associate  
20 the archived information with attribute information such as electronic  
signatures or time stamps.

**[0034]** Referring now to **Figure 2**, there is shown a functional  
block diagram of a TRS server **240** that may correspond to TRS server  
**140** of **Figure 1**. A network interface **242** in TRS server **240** facilitates a  
25 data flow between a data network (i.e., data network **104** of **Figure 1**)  
and TRS server **240** and typically executes a special set of rules (a  
protocol) for the end points in a link to send data back and forth. One of  
the common protocols is TCP/IP (Transmission Control Protocol/Internet  
Protocol) commonly used in the Internet. The network interface  
30 manages the assembling of a message or file into smaller packets that

5 are transmitted over the associated data network and reassembles received packets into the original message or file. In addition, TRS server **240** handles the address part of each packet so that it gets to the right destination.

10 **[0035]** TRS server **240** comprises a processor (or multi-processor) **248**, a server module **242** and a storage space **246**. In practice, any computing device having reasonable computing resources (i.e., processing power and memory capacity) may be utilized as an TRS server. Storage space **246** may be resident within TRS server **240** or in a separate accessible server device (not shown). Part of the  
15 storage space **246** is allocated to retain captured information from the client devices and accessible upon request. It should be noted the storage space **246** may be a single storage device or a cluster of storage devices located locally and/or remotely (e.g. storage space **249** is connected through a network). In one embodiment, the captured  
20 information may be respectively associated with a particular user, type information of the client device, billing information, electronic signatures, device information etc..

**[0036]** According to one embodiment of the present invention, server module **242** is a compiled and linked version of a computer  
25 language implementing the present embodiment and loaded in a memory. When executed by TRS server **240** (i.e. processor **248**), server module **242** performs a number of functions to facilitate the operations associated with a preferred embodiment of the present invention.

5           **[0037]** \_\_\_\_\_ Server module **242** comprises a management module **242a**, validation module **242b**, attribute module **242c**, security module **242d**, indexing module **242e** and content analysis module **242f**. Management module **242a** provides account initialization, management and service functions for a plurality of user accounts associated with  
10           users having access to this service. In one embodiment, management module **242a** is an interface selectively accessible by users and an administrator respectively. Typically, a user is permitted to retrieve the recording of his/her screen activities while an administrator is permitted to retrieve any one's recording.

15           **[0038]** \_\_\_\_\_ Validation module **242b** provides validation services that serve to generate evidence that the archived event information has not been modified. The evidence may take the form of alphanumeric character strings containing encoded or encrypted information associated with the archival information. For example, a portion of the  
20           archived event information may be incorporated into a machine-readable symbol or a certified copy may be accessed via a trusted third party server device. Attribute module **242c** associates additional information (i.e., time stamps, electronic signatures, position information, etc.) with the archived event information. Security module **242d** protects  
25           the archived information from unauthorized access. Indexing/Routing module **242e** provides services relating to cataloging and providing an index of available event files. Content analysis module **242f** is used to analyze what is in the captured events (i.e. screens). In one embodiment, content analysis module **242f** employs an OCR engine to  
30           perform optical character recognition of one or more selected pages of

5 the captured events. Together with indexing module **242** , content analysis module **242f** may help automatic indexing of the captured events. It is clear to those skilled in the art that not every element in the module **242** needs to be implemented to achieve the desired results contemplated by the present invention.

10 **[0039]** **Figures 3A to 3G** illustrate a series of representative screen displays that may be captured, validated and processed in accordance with an embodiment of the present invention. The screen displays may be displayed on a display screen of a computing device, such as a personal laptop/desktop computer and a personal data  
15 assistant (PDA).

**[0040]** As used herein, a display screen or a screen is the physical display apparatus in a computing device, such as a 15 inch CRT or LCD screen commonly seen with a computing device. A screen display, a displayed page, a displayed window or simply a display is an  
20 image presented on the display screen. For example, a file that constitutes a display may be an HTML file, wherein HTML stands for HyperText Markup Language, an image thereof appears on a display screen when the file is read or executed by a display application.

**[0041]** To understand the representative screen displays in  
25 **Figures 3A to 3G**, a PDA is used as one of the exemplary computing devices. PDA **312** may correspond to PDA **112** of **Figure 1** and includes a user interface comprised of a display/touch screen, a navigation key-set, application keys and softkeys which may be used to interact with the PDA **312**. In accordance with an embodiment of the present

5 invention, the TRS archiving can be initiated through a TRS program  
key **315**, a touch of a designated area on a screen display, an entry of a  
predefined word or web address.

**[0042]** In one embodiment, the TRS archiving is initiated when a  
user logs onto a particular screen display, such as an initial page of a  
10 personal account. Once TRS archiving is initialized, user interactions  
with PDA **312** (i.e. screen content, user inputs, URI's, and associated  
cached information) for the series of screen displays illustrated in  
**Figures 3A to 3G** are sequentially captured.

**[0043]** Each of the screen display is captured by a screen  
15 capturing process that may be an application or a Java applet  
embedded in a display. In one embodiment, the screen capturing  
process is implemented by utilizing calls provided in Microsoft  
Foundation Class (MFC) supported in MS Windows OS. An example of  
such implementation is provided as follows:

```
20  BOOL CaptureCurrentScrollArea(int nHeight)
    {
        // create a XImage object
        // XImage is a predefined class and contains image
        // attributes and device dependent bitmap object.
25  XImage* pImage = new XImage;

        // assign the image attributes.
        // x_IWidth is the image width being captured.
        // nHeight is the height for the scroll area.
30  // g_uSysBitCount is system graphics bit/pixel setting.

        pImage->x_IWidth = x_IWidth;
        pImage->x_IHeight= nHeight;
35  pImage->x_wBitsPixel = g_uSysBitCount;

        // create screen DC
```

```

5      // this DC will be used to copy bitmap from the scroll area

      CDC dcScr;
      dcScr.CreateDC("DISPLAY", NULL, NULL, NULL);

10     // create a device dependent bitmap object.

      if (!pImage->bitmap.CreateCompatibleBitmap
          (&dcScr, pImage->x_IWidth, pImage->x_IHeight))
          return FALSE; // the capture is not successful.

15     // an empty bitmap is created.
      // now create a compatible memory DC.

      CDC dcMem;
      BOOL bCreateDC =
20         dcMem.CreateCompatibleDC(&dcScr);
      CBitmap* pOldBmp =
          dcMem.SelectObject(&pImage->bitmap);

25     // ready to copy the bitmap from the scroll area.
      // BitBlt is the critical function call to do the job.
      // g_rcCapture is the global variable that contains the
      // coordinates of the current window being captured.

30     dcMem.BitBlt(0,
                   0,
                   pImage->x_IWidth,
                   pImage->x_IHeight,
                   &dcScr,
35     g_rcCapture.left,
                   g_rcCapture.bottom - nHeight,
                   SRCCOPY);
      dcMem.SelectObject(pOldBmp);

40     // the job is done.
      // the XImage object contains the captured bitmap of
      // the scroll area.
      // store the captured image in a local file.

45     if (!SaveBitmapToTempFile(pImage))
          return FALSE; // the capture is not successful.

      // calculate the total height of the complete image

50     g_nTotalHeight += nHeight;

```



```

5      // the saved image file will be used in the image
      // concatenation when we stitch individule pieces
      // of the document image back into its entirety.

10     return TRUE;    // the capture is successful.
    }

```

wherein g\_rcCapture is the global variable that contains the coordinates of the active window being captured. The only parameter passed by calling module is the height of the display window that can be readily determined.

**[0044]** Once the displays in **Figures 3A to 3G** are captured, the displays or contents therein may be supplemented with attributes such as a time stamp to indicate when the displays or contents are captured. The displays or contents therein may be also processed such that the displays selective or content elements can receive special treatment (e.g. encrypted) and afterwards be compressed using a compression process. In a preferable embodiment, the displays or processed versions thereof are uploaded to a remote server through a network (e.g. a LAN, a wireless network, or the Internet).

**[0045]** **Figure 4** illustrates a representative series of screen displays that have been captured in accordance with screen displays shown in **Figures 3A to 3G**. Validation information for the series of screen displays may be associated with each individual screen display or may be grouped into a single validation entity that represents the group as a whole. Additionally, there may be separate validation entries for each of the individual screen displays and the series of screen displays as a whole. As shown in **Figure 4**, each of the captured displays has been respectively attributed with a time stamp to indicate

5 when the display is captured at the terminal device or arrived at the server.

[0046] **Figure 5** is a functional diagram of a process associated with processing (i.e., encryption, validation and compression) a series of captured screen displays **501** in accordance with an embodiment of the present invention. Each of screen displays **501** is initially cached at **501** and may be processed (e.g. texts are recognized by an OCR process) or parsed so that content elements requiring special treatment may be proceeded. For example, some of the content elements contains classification tags (i.e., "classified" and "unclassified") then those elements (i.e., credit card numbers, account numbers etc.) can be singled out for special treatment such as encryption. At **505** validation data such as time stamps or electronic signatures are added and the screen displays (including the attributed ones) may then be compressed. The processed file is stored in a TRS database at **507** that may be resident on the subject terminal device or a remote server device. Upon request, the stored file can be retrieved and replayed at **509**. In one application, a viewer can assess what transactions a user (i.e. a person who interacts with the terminal device) has entered and how the user was reacted to the transactions. The assessment may potentially provide useful marketing feedback.

[0047] **Figure 6A** shows a process **600** of a terminal device being interacted with a user. Generally, the terminal device is coupled to a server and provides a mechanism to the user to perform certain functions. For example, the server is a brokerage (e.g. [www.schwab.com](http://www.schwab.com)) from which the user can trade stocks during

5 business hours or the server is an internal data center with which the  
user can exchange data through the terminal device. After the user  
logs onto the server and navigates to a page or display that may be  
the initial display for a transaction. According to one embodiment, when  
the initial display embedded with a flag or a signal that can trigger the  
10 TRS process comes in at **602**, a screen capturing application is  
activated at **604**. As described above, the screen capturing application  
may be preinstalled in the terminal device or downloaded with or  
embedded in the initial display.

**[0048]** As the user interacts with the initial display or proceeds  
15 with subsequent displays, the displays are automatically captured by the  
screen capturing application at **606**. The user's interactions with the  
terminal device may include an entry of data, one or more  
words/phrases, a click of a designated area in the display. As an option  
at **608**, the captured displays may be attributed with one or more notions  
20 that include a timestamp, the user's identity information or device  
information of the terminal device.

**[0049]** At **610**, it is determined if the respectively captured  
displays are to be cached. Depending on an exact implementation, each  
of the captured displays is respectively transported to a storage device  
25 at **612**, hence there is no need for caching a captured display. The  
storage device may be a server located separately with respect to the  
terminal device and coupled thereto through a data link under a session  
(e.g. opened for the transaction). Whenever a display is captured, the  
image thereof is transported to the storage device. At **614**, the process  
30 **600** goes to **606** to capture another display till no more displays need to

5 be captured, which can be indicated within a last display to inactivate the screen capturing application. When no more displays need to be captured, the process **600** ends.

10 **[0050]** Depending on another implementation that required that all captured displays are transported together to the server, then a captured display is to be cached at **610**, and the captured display is stored in a memory space **616**. At **618**, the process **600** may go to **606** to capture another display till no more displays need to be captured, which can be indicated within a last display to inactivate the screen capturing application. At **620**, the captured displays are then transported to the server and the process **600** end.

15 **[0051]** It should be noted that an optional procedure may be provided just before **612** or **620** to process the captured display(s). In one embodiment, the captured displays in image format can be compressed using a commonly known image compression technique such as JPEG. In another embodiment, the captured images are compressed using a commonly known image compression technique such as MPEG or other compression to take the advantage of similarity between two immediate displays. The purpose is to reduce the data size so that the transportation of the captured displays to the server is more efficient over the data line. In any event, the captured image or images, regardless processed or not, are referred to as a file that may be resident locally or being transported to the server.

20 **[0052]** **Figure 6B** shows a process **640** of a server communicating with the terminal device as discussed in **Figure 6A**. At

5           **642**, the server awaits a request if any file is upcoming from a terminal device such as the one in **Figure 6A**. When a request is received, the server assigns an identification to the file so that a query can be made later to retrieve the file when there is a need to review the file. Depending on an exact implementation or application, the identification  
10           may be a session ID, a transaction ID or any ID that can uniquely identify the file. At **646**, the file is received. At **648**, it is determined if there is another file related to the arrived file. As described above, sometimes, there are multiple files each comes individually for one transaction and sometime there is only one compounded file. If it is  
15           determined that there are no more files, the arrived files are then kept in a storage space at **650** for future retrieval.

**[0053]**       **Figure 6C** shows a flow process **660** of retrieving the archived file at a terminal associated with the server. At **662**, the process **660** awaits a retrieval or replay request that may come from a  
20           terminal operated by an operator. The request may include parameters related to a transaction ID or user identifier information so that a correct file may be located. For example, a business desires to review a user's behavior with respect to its web site, the process **600** can be used to view how the user interacts with the web site. A request may include a  
25           query of the user's ID. When the replay request is received, the process **660** is preferably instructed how to play back the archived file, namely in a specified order. At **666**, the process **660** proceeds to look up for the file. At **668**, the file is played back and displayed on a screen for review.

**[0054]**       The invention may be implemented as a method, a system  
30           or code on a computer readable medium (i.e. a substrate). The

5 computer readable medium is a data storage device that can store data,  
which can thereafter, be read by a computer system. Examples of a  
computer readable medium include read-only memory, random-access  
memory, CD-ROMs, magnetic tape, optical data storage devices and  
carrier waves. The computer readable medium can be distributed over  
10 a network coupled computer system so that the computer readable code  
is stored and executed in a distributed fashion.

**[0055]** The advantages of the invention are numerous. Different  
embodiments or implementations may yield one or more of the following  
advantages. One advantage of the invention is that user's interactions  
15 with terminal devices can be archived in a form that could be hardly  
altered (e.g. an image of a screen display) and validated for future use.  
Another advantage of the invention is that supplemental information may  
be associated with the archived content (i.e., time stamps, electronic  
signatures, location information, subject, and indexing). Still another  
20 advantage of the invention is that the individual screen displays may be  
stored as a single file that can be played back to show how each of the  
screen displays is formed.

**[0056]** The many features and advantages of the present  
invention are apparent from the written description, and thus, it is  
25 intended by the appended claims to cover all such features and  
advantages of the invention. Further, since numerous modifications and  
changes will readily occur to those skilled in the art, it is not desired to  
limit the invention to the exact construction and operation as illustrated  
and described. Hence, all suitable modifications and equivalents may  
30 be considered to fall within the scope of the invention.



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## Claims

*We claim:*

1. ~~— A method for archiving an interaction by a user with a terminal device having a display means and a random access memory, the method comprising:~~

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~~— reading a series of user interface events from the random access memory in the terminal device; wherein the series of user interface events represents a series of screen displays being displayed during a period of time indicated by an initiation signal and a termination signal;~~

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~~— generating one or more files representing the series of user interface events; and~~

~~storing the generated one or more files in a storage area.~~

2. ~~— The method as recited in claim 1 further comprising: generating one or more attributes to be associated with each of the one or more files.~~

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3. ~~— The method as recited in claim 2, wherein the one or more attributes includes an alphanumeric character string.~~

4. ~~— The method as recited in claim 3, wherein the alphanumeric character string is encrypted.~~

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5. ~~— The method as recited in claim 1 further comprising: generating one or more attributes to be associated with each of user interface events.~~



5       6. ~~—The method as recited in claim 5, wherein the one or more attributes include one or more of (1) a time stamp, (2) an electronic signature, (3) terminal device location information, (4) information relating to the terminal device, (5) user information, (6) relative sequence index and (7) system provided information.~~

10       7. ~~—The method as recited in claim 1, wherein each of the screen displays includes an interaction of the user with the terminal device.~~

15       8. ~~—The method as recited in claim 7, wherein the interaction includes one or more of (i) an entry by the user, (ii) a click by the user and (iii) a word or phrase.~~

20       9. ~~—The method as recited in claim 1, wherein the generating of the one or more files includes compressing the file according to a compression scheme.~~

10. ~~—The method as recited in claim 1, wherein each of the user interface events is an image.~~

25       11. ~~—The method as recited in claim 10, wherein each of the one or more file is an image representation of the user interface events.~~

30       12. ~~—The method as recited in claim 1, wherein the generating of the one or more files includes selectively processing elements contained within each of the one or more files.~~

5       13. ~~The method as recited in claim 12, wherein the selectively processed elements are encrypted.~~

14. ~~The method as recited in claim 1, wherein the storage area is located remotely and accessible through a data link.~~

10       15 ~~The method as recited in claim 14, wherein the storing of the generated one or more files in a storage area includes transmitting the generated one or more files to the storage area through the data link.~~

15       16. ~~A method for archiving an interaction by a user with a terminal device having a display means and a random access memory, the method comprising:~~

20       ~~uploading a file to a display device upon receiving a playback request, wherein the file includes a representation of a series of screen displays that are captured when the user interacts with the terminal device; and~~

25       ~~displaying the series of screen displays on display device accordingly to a specified order.~~

30       17. ~~The method as recited in claim 16, where the specified order is to display the screen displays sequentially so that progresses reflecting how the user interacts with the terminal device can be replayed.~~

18. ~~The method as recited in claim 17, where the series of screen displays are respectfully captured when the user enters a transaction through the terminal device.~~

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19. —The method as recited in claim 17, where the series of screen displays are respectfully captured when the user enters an command to the terminal device.

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20. —A system for archiving an interaction by a user with a terminal device having a display means and a random access memory, the system comprising:

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a terminal device including a memory space and a screen, the memory space including data for displaying on the screen, wherein the terminal device is configured to generate a series of images from the data when a user of the terminal device interacts therewith; and

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a server computer located remotely with respect to the terminal device and communicating with the terminal device over a data network, the server including a storage space and receiving one or more files from the terminal device, the one or more files respectively representing the series of images, wherein the server is configured to archive the file in the storage space.

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21. —The system of claim 20, wherein the terminal device generates the one or more files as soon as the series of images are cached.

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22. —The system of claim 21, wherein the terminal device generates one or more attributes to be associated with at least one of the one or more files.

5       23. ~~The system of claim 20, wherein the terminal device is configured to cause the one or more files to be transmitted over the data network to the server.~~

10       24. ~~The system of claim 20, wherein the server includes a server module configured to index the received one or more files in the storage space.~~

      25. ~~The system of claim 24, wherein the server module includes an OCR engine to analyze the received one or more files and automatically generate keywords for indexing the received one or more files.~~

15       26. ~~The system of claim 23, wherein the server module includes a processing engine to parse and selectively process file components in each of the one or more files.~~

20       27. ~~The system of claim 20, wherein the server includes an interface configured to retrieve the one or more files from the storage space when a playback request is received.~~

25       1. A method for tracking predetermined activities for a terminal display, the method comprising:

providing a series of displays on the terminal display, at least some of the displays requiring interactions from a user and being referred to as interactive displays;

30       capturing one of the interactive displays after the one of the interactive displays has been altered with at least one interaction from the user in accordance with a predetermined requirement;

5           saving the captured display into an image;  
          continuing to successively display a next one of the interactive  
          displays till a last one of the interactive displays, wherein each of  
          the interactive displays is captured in a sequence of being  
          displayed, and each of the captured displays includes at least  
10          one interaction from the user in accordance with a predetermined  
          requirement; and  
          sending at least some of the captured displays to a server.

15          2.     The method of claim 1 further comprising generating one or more  
          attributes to be associated with each of the captured displays.

          3.     The method of claim 2, wherein the one or more attributes includes  
          an alphanumeric character string.

20          4.     The method as recited in claim 3, wherein the alphanumeric  
          character string is encrypted.

          5.     The method as recited in claim 3, wherein the alphanumeric  
          character string pertains to a time at which any of the interactive displays  
25          was altered.

          6.     The method as recited in claim 2, wherein the one or more attributes  
          include one or more of (1) a time stamp, (2) an electronic signature, (3)  
          terminal device location information, (4) information relating to the terminal  
30          display, (5) user information, (6) relative sequence index, or (7) system  
          provided information.

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7. The method as recited in claim 1, wherein the interaction includes one or more of (i) an entry by the user, (ii) a click by the user and (iii) a word or phrase.

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8. The method as recited in claim 1, wherein the sending of at least some of the captured displays to the server includes compressing the captured displays into a file according to a compression scheme.

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9. A method for tracking predetermined activities for a terminal display, the method comprising:

uploading a file to a display device upon receiving a playback request, wherein the file includes a representation of a series of captured screen displays of a terminal display associated with a user, wherein each of the screen displays reflects at least a change entered by the user in comparing with an original version thereof; and  
displaying the series of screen displays on the display device in a specified order to show how the user has altered each of the screen displays.

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10. The method as recited in claim 9, where the series of screen displays is analyzed by an OCR.

11. A terminal device for tracking predetermined activities therewith, the terminal device comprising:

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a display screen;

5           a memory space provided with data, the data configured to generate  
          a series of displays for the display screen, at least some of the  
          displays requiring interactions from a user and being referred to  
          as interactive displays;  
          an embedded module automatically triggered to capture a portion of  
10          the data corresponding to one of the interactive displays after the  
          one of the interactive displays has been altered with at least one  
          interaction from the user in accordance with a predetermined  
          requirement, wherein the embedded module is configured to save  
          the portion of the data and forward a file including the portion of  
15          the data to a server.

12.   The terminal device of claim 11, wherein the file includes other  
      captured data related to some of the interactive displays

20   13.   The terminal device of claim 12, wherein the embedded module  
      includes generating one or more attributes to be associated with the portion  
      of the data.

25   14.   The terminal device of claim 13, wherein the one or more attributes  
      includes an alphanumeric character string.

15.   The terminal device of claim 14, wherein the alphanumeric character  
      string is encrypted.

30   16.   The terminal device of claim 14, wherein the alphanumeric character  
      string pertains to a time at which any of the interactive displays was altered.

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17. The terminal device of claim 14, wherein the one or more attributes include one or more of (1) a time stamp, (2) an electronic signature, (3) terminal device location information, (4) information relating to the terminal display, (5) user information, (6) relative sequence index, or (7) system provided information.

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18. The terminal device of claim 11, wherein the interaction includes one or more of (i) an entry by the user, (ii) a click by the user and (iii) a word or phrase.

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19. The terminal device of claim 11, wherein the embedded module includes compressing the portion of the data according to a compression scheme.

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20. The terminal device of claim 11, wherein the file pertains to image pixels and is subjects to be analyzed by an OCR engine at the server.

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**METHOD AND SYSTEM FOR TRACKING SCREEN ACTIVITIES ES FOR  
MULTI-SCREEN TRANSACTIONS**

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Techniques to facilitate a system to capture, process, and archive a series of user interactive events and subsequently retrieve the stored user interactive events are disclosed. The captured information is indexed and stored for future access either on a terminal device or an accessible remote server device.

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